

**ABSTRACT**

This invention relates to methods for detecting and sequencing target nucleic acid sequences, to mass modified nucleic acid probes and arrays of probes useful in these methods, and to kits and systems which contain these probes. Useful methods involve hybridizing the nucleic acids or nucleic acids which represent complementary or homologous sequences of the target to an array of nucleic acid probes. These probes comprise a single-stranded portion, an optional double-stranded portion and a variable sequence within the single-stranded portion. The molecular weights of the hybridized nucleic acids of the set can be determined by mass spectroscopy, and the sequence of the target determined from the molecular weights of the fragments. Nucleic acids whose sequences can be determined include DNA or RNA in biological samples such as patient biopsies and environmental samples. Probes may be fixed to a solid support such as a hybridization chip to facilitate automated molecular weight analysis and identification of the target sequence.

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